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Hemodialysis: Management problems in developing countries, with Nigeria as a surrogate

EBUN L. BAMGBOYE

Consultant Nephrologist, St. Nicholas Hospital, Lagos, Nigeria

Hemodialysis: Management problems in developing countries, with Nigeria as a surrogate. The incidence of end-stage renal failure is increasing worldwide at an annual growth rate of 8%. Data for much of the developing world are often unavailable, but given the prevalence of poor socioeconomic factors, the incidence is likely to be greater. In Sub-Saharan Africa, economic and manpower factors dictate a conservative approach to therapy in most instances. The majority of those with end-stage renal disease (ESRD) perish because of the lack of funds, as very few can afford regular maintenance dialysis and renal transplantation is often not available. Hemodialysis (HD) remains the most common modality of management, with a very few units offering peritoneal dialysis (PD). Limitations to regular maintenance HD include the paucity of dialysis units, restriction of those units to urban centers, and the absence of government funding or subsidy and health insurance to cover the relatively high costs of dialysis. The few available units are bedeviled with multiple problems: old machines frequently break down, absence of adequate maintenance technical support and spare parts, and frequent power outages. Staff motivation and remuneration are equally poor with consequent disruption of services due to industrial action and emigration of trained staff to the Middle East and Western world. Present avenues for improvements include: focusing on prevention to stem the high prevalence of ESRD, greater government involvement to better fund units and thus enhance the quality of services rendered, and the wider availability of transplantation.

The incidence of end-stage renal disease (ESRD) is increasing worldwide at an annual growth rate of 8%, far in excess of the population growth rate of 1.3% [1]. Nearly one million people are receiving hemodialysis worldwide, 60% of whom are treated in five countries (USA, Japan, Germany, Brazil and Italy) that constitute only 12% of world population. Twenty percent are treated in 100 developing countries that make up 50% of world population [1]. Recent estimates indicate that sub-Saharan Africa contributes less than 4000 ESRD patients to the dialysis population, less than 1% of the world total [2].

Key words: hemodialysis, Nigeria, viral screening, erythropoietin.

Opportunities for hemodialysis vary widely between countries (Table 1), with the highest frequency of dialysis found in the developed world [1]. Economic and manpower factors often determine the availability of hemodialysis, and in low income societies ESRD patients often perish without the benefit of renal replacement therapy (RRT) for lack of funds [3, 4].

Several limitations to establishing functional hemodialysis units have been identified. For the most part the overwhelming cost of establishing these units is responsible for the reluctance of governments to commit resources for dialysis indefinitely, and for the absence of viable renal transplantation programs [5].

HEMODIALYSIS IN NIGERIA

Chronic hemodialysis became available in Nigeria in November 1981 [6], and the country now has 27 dialysis units. The majority are in public hospitals (67%) and all are situated in major cities, particularly state capitals where less than 40% of the population resides. Twenty-five percent are in Lagos, the financial capital of the country. Lagos also has 75% of the privately run dialysis units, since most of those able to afford dialysis live in Lagos.

St. Nicholas Hospital Dialysis and Transplant Unit in Lagos was established in August 1998 and remains the only hospital in the country performing renal transplantation [7]. The hospital caters primarily to the wealthier members of the society.

FUNDING OF DIALYSIS

There is no government funding or subsidy for dialysis in Nigeria [8]. There is also no established health insurance, although many private companies and some public parastatal companies pay dialysis costs for their staff and dependents with ESRD. Very few, however, are willing to support these patients indefinitely. Consequently, 70% of ESRD patients cannot afford long-term dialysis at the University College Hospital (UCH) in Ibadan [7]. At St. Nicholas Hospital, a private hospital, the situation is

Table 1. Estimate of dialysis population in sub-Saharan Africa in 2000

Country	Dialysis population	Providers	Machines	Population *millions*	Remarks
S Africa	2200	73	660	43	HD55%PD45%
Mauritius	500	7	80	1.5	HD
Nigeria	300	27	80	120	HD
Kenya	220	7	40	29	HD70%PD30%
Cote D'Ivoire	130	6	30	15.5	HD
Mauritania	50	1	10	2.5	HD
Ghana	30	5	10	20	HD
Cameroon	30	3	7	15.5	HD
Benin	40	1	10	6.1	HD
Gabon	35	2	10	1.2	HD (1PD)
Senegal	25	3	14	10	HD
Mali	15	1	4	10.5	HD
Burk Faso	10	1	7	11.3	HD
Ethiopia	5	2	5	75	HD

slightly different. Of the 184 dialysis patients in the year 2000, 159 were privately funded, and in 25 of these patients the dialysis was paid for by the companies for which they worked. At the St. Nicholas Hospital 60% of the dialysis patients are able to afford maintenance dialysis for more than ten sessions compared with 70% not able to afford more than three sessions of dialysis at the UCH.

Aside from the problem of funding, the majority of patients live far away from existing dialysis centers, so that they have to travel long distances to receive dialysis [8, 9]. As many as 35% of patients at UCH have to travel from outside Ibadan. At the Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), located in Ile-Ife, patients have had to travel distances up to 1265 km to receive dialysis [10]. Consequently, dialysis is frequently inadequate and the patients have frequent work disruption leading to loss of their jobs [6].

HEMODIALYSIS PATIENT CHARACTERISTICS IN NIGERIA

The majority of the patients receiving dialysis are young and productive, and many are the major breadwinners of their families [6, 8] The age range for 65% of the patients at the UCH is between 15 and 55 years, and at the St. Nicholas Hospital 70% are younger than 50 years of age. The mean age for all dialysis patients is 38.6 years. The male:female ratio is approximately 2:1. At the UCH, Ibadan, the ratio is 2.9:1, and at the St. Nicholas Hospital, Lagos, the ratio is 2.4:1. At the Lagos University Teaching Hospital (LUTH), Lagos, the ratio is 1.8:1 [5]. The reason for this male preponderance is unclear, but it has been suggested that most of the families are more willing to expend scarce resources on the males.

Many of the patients present late, with 75% of them in ESRD at presentation [8]. Frequently, the diagnosis is inaccurate prior to arrival at hospital for dialysis, and without the recognition of renal failure.

VIRAL SCREENING

Viral screening is done routinely for hepatitis B virus (HBV) and human immunodeficiency virus (HIV), but few centers screen for hepatitis C virus (HCV). Fortunately, the prevalence of HCV infection is less than 1%. Among ESRD patients on dialysis at St. Nicholas Hospital, the prevalence of HBsAg is 10%, and the prevalence of HCV is 3%. All HCV positive patients had previously dialyzed in units in other countries, and many of them may have acquired the HCV in those units. Only one unit in Nigeria currently offers hemodialysis to HIV-positive patients. All units isolate viral positive patients to separate machines.

VASCULAR ACCESS

Femoral catheters are typically used for vascular access in most units [7]. At the St. Nicholas Hospital, the frequency distribution of vascular access types is 35% for femoral, 29% for arteriovenous (AV) fistula, 22% for subclavian catheter, 8% for internal jugular catheter, and 6% for arteriovenous graft. The use of femoral catheters is even higher at UCH, Ibadan [7]. The long-term central venous catheters are more expensive than the femoral catheters, and most patients find it difficult to afford them and the cost of hemodialysis within their meager budgets [6].

Arteriovenous fistula creation is equally expensive and there is a paucity of skilled technicians and surgeons for access surgery. AV fistula access failure is common, not only because of poor surgical techniques, but because the fistulae are often put into routine use before full maturation [9]. Arteriovenous grafts are even less frequently used due to the cost of the Gortex graft. The only patient with a Gortex graft at St. Nicholas Hospital had it placed in the USA prior to commencing dialysis in the unit.

Repeated use of femoral catheters leads to fibrosis

and complicates renal transplantation in those lucky enough to receive a donor kidney.

ERYTHROPOIETIN

Erythropoietin is available in most centers, but the majority of patients cannot afford to use it appropriately. Further, the potency is uncertain because of improper storage due to erratic power supply, and the fact that there are several parallel importers. Consequently, anemia is quite common.

DIALYSIS FACILITIES

Many of the dialysis machines in Nigeria are outdated. Spare parts are not readily available, and when they are, they are very expensive. Several of these dialysis machines do not have the capability for closed volumetric ultrafiltration and, therefore, the units are limited to the use of low flux dialyzers. No dialysis units currently offer convective dialysis. Only 25%, that is, eight units, offer bicarbonate dialysis, and of these, six are privately owned and operated, primarily in Lagos. Acetate dialysis is preferred by most units because it is relatively cheaper and less problematic to use than bicarbonate systems.

Other problems encountered in the hemodialysis units in Nigeria are the frequent public power supply disruptions and erratic water supply [7]. Consequently, the units have to purchase back-up generators and stabilizers to protect the dialysis machines, further increasing their set-up costs. Moreover, most units have to dig their own wells to ensure a regular water supply. Fortunately, Nigerian water is generally soft, but there is still a need for water treatment units.

Re-use of dialyzers to cut costs is common, with at least seven units (25%) carrying out regular dialyzer reuse [7]. The potential complications of sepsis, febrile reactions, cross infections and reactions to formaldehyde, however, are fortunately rare.

HEMODIALYSIS UNIT STAFFING

Many kidney specialists, dialysis nurses and even technicians emigrate to the Middle East and the Western world so that they can enjoy a better standard of living. Remuneration is quite poor in Nigeria and some of the staff of public hospitals engage in private practice at the expense of public service, so that the quality of care at these public hospitals suffers. Furthermore, nationwide strikes among doctors, nurses, and non-academic staff have disrupted dialysis operations on at least six occasions in the last three years (one for as long as 3 months) [6]. During these strikes, many of the patients could not afford to switch to the privately run dialysis units [8]. As a consequence, many of them had died by the time the units eventually reopened.

RECOMMENDATIONS

Recommendations to ensure a better quality of hemodialysis care in Nigeria and other developing countries include the establishment of a functional National Health Insurance Scheme [6]. A National Kidney Foundation also would be helpful in coordinating activities among the various units. The Foundation could purchase supplies in bulk, which may help reduce dialysis costs, making it affordable to more patients. Additional training opportunities for the staff also are essential, preferably in collaboration with units in other countries.

Recently, an increase in remuneration has been approved by the government and hopefully this will reduce the frequency of strikes among hospital staff. Finally, the development of a Kidney Transplant Program should be pursued vigorously as it may be the most cost effective means for managing ESRD in the developing world [6].

Reprint requests to Dr. E.L. Bamgboye, MBBS, FWACP, Consultant Nephrologist, St. Nicholas Hospital, 57 Campbell Street, Lagos, Nigeria. E-mail: ebunbamgboye@alphalinkserve.com

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